THE NORTHWESTERN UNIVERSITY

Reviewing Stand

EVANSTON, ILLINOIS

Illinois U Library

# Peacetime Uses and Problems of Atomic Energy

A radio discussion over WGN and the Mutual Broadcasting System

GEORGE GRANGER BROWN

Chairman, Department of Chemical and Metallurgical Engineering, University of Michigan
Director of Engineering, Atomic Energy Commission

FARRINGTON DANIELS

Professor of Chemistry, University of Wisconsin

SIDNEY D. KIRKPATRICK

Editorial Director, *Chemical Engineering* and *Chemical Industries*

PAUL E. KLOPSTEG

Professor of Applied Science and Director of Research, The Technological Institute, Northwestern University

Moderator: JAMES H. McBURNEY

Dean, The School of Speech, Northwestern University

Broadcast continuously since 1934 by Northwestern University

Vol. 15, No. 9 October 1, 1950

THE REVIEWING STAND is a weekly radio forum presented by Northwestern University. The program was first broadcast by Station WGN, Chicago, October 14, 1934. It has been on the air continuously since that time, originating in the WGN studios, and, since 1935, carried by the stations of the Mutual Broadcasting System. THE REVIEWING STAND presents members of the Northwestern University faculty and distinguished guests from business, government, education, and the press in round table discussions of contemporary problems—the questions that are in the news. The program is under the direction of James H. McBurney, Dean of the School of Speech, Northwestern University, and Miss Myrtle Stahl, Director of Educational Programs, WGN, Chicago.

The Northwestern University Reviewing Stand, published weekly beginning May 2, 1943, by the Offices of the Director of Radio (Public Relations), Northwestern University, Evanston, Illinois. Entered as second class matter at the Post Office, Evanston, Illinois, under the Act of March 3, 1875. Subscription price, $1.00 for 16 weeks, $2.00 for 32 weeks, $2.50 for one year. Single copies, ten cents.

# Peacetime Uses and Problems of Atomic Energy

MR. MCBURNEY: Our speakers today are George Granger Brown, Chairman of the Department of Chemical and Metallurgical Engineering at the University of Michigan, and Director of Engineering for the Atomic Energy Commission; Farrington Daniels, Professor of Chemistry at the University of Wisconsin; Sidney D. Kirkpatrick, Editorial Director of *Chemical Engineering* and *Chemical Industries;* and Paul E. Klopsteg, Professor of Applied Science and Director of Research at the Northwestern University Technological Institute.

So far as atomic energy is concerned, public attention has centered very largely on the atomic bomb, on atomic energy as a method of warfare, and defense against its use. Today we discuss the peacetime uses and problems of atomic energy.

Brown, what are the more important areas in which we may expect to use atomic energy? I'm talking now about peacetime uses.

## 'Two Fields'

MR. BROWN: It seems to me that for peacetime application there are really two fields of use. Perhaps the one of widest range of interest is in the production of special products or isotopes which might be useful in industry or in science, and also in medicine.

Along with the operation of these nuclear reactors, we always find that heat is given off, and if this heat is given off at a sufficiently high temperature, it can be used for useful purposes, for the production of power; and therefore the second use of atomic energy for peacetime purposes is for power, either as a by-product of the reactor or possibly as a major objective under certain conditions.

MR. MCBURNEY: Do you have anything to add to that, Kirkpatrick?

MR. KIRKPATRICK: I think we could detail the application of power—bring it down to a few points such as the use of such power in aircraft and ship propulsion, both of which are active fields of interest today, and are being investigated. They are peacetime as well as military applications.

MR. MCBURNEY: Daniels, do you have a word on this?

MR. DANIELS: One might add that the neutron beams from these atomic furnaces are useful for scientific purposes as well, but the great hope, from the general point of view, is for the use of atomic power.

MR. MCBURNEY: How sanguine are you, Klopsteg, about these developments? Do you think they are practical?

MR. KLOPSTEG: Well, they are practical enough, given enough time and enough incentive. But as I see it, the development of power from the nucleus is a long way off, because at the moment, industry doesn't have the incentive; and besides, I don't believe that for years to come, power from the atomic nucleus can compete economically with power from our usual sources.

## 'Weapons Only Present Use'

MR. BROWN: I agree with what Klopsteg has said from one standpoint only, and that is if the power is to be the only purpose of the reactor. For example, at the present time we know that the major purpose of these reactors—in fact, almost their exclusive purpose—is for the production of material for use in weapons. If we can combine this use of the reactors for the production of weapons with the use of the heat which is given off as a by-product for the production of power (and that is certainly within the

realm of practicability within a few years) then the use of nuclear energy for the production of power seems to me to be an economic possibility in which private enterprise could be actively interested in a very short time.

MR. MCBURNEY: Do you other men go along with that point of view?

MR. DANIELS: I would like to go still further than that. I feel that we do not know at the present time how competitive atomic power might be with present fuel power. We just haven't run pilot plants yet. We don't know how frequently the fuel has to be reprocessed. We don't know how serious the radioactive contamination of the machinery is. It might turn out that it is not as bad as we now feel. I believe that we should make rapid strides in putting pilot plants into operation to find out what the cost will be.

## By-Products

MR. MCBURNEY: Well, now, you gentlemen are talking about these peacetime developments—power, heat and these radioactive isotopes—as a by-product of war production. In what sense would these be by-products? Explain that a little, Brown.

MR. BROWN: Well, in the production of plutonium, which is a major ingredient in our atomic bombs—

MR. MCBURNEY: And that derives from uranium, I take it?

MR. BROWN: Plutonium is automatically produced when we operate a reactor on natural uranium. There is, of course, a large number of neutrons that may be available for other purposes, as well, and these neutrons in the pile, or the reactor, can be applied to the production of isotopes.

In the course of this reaction which takes place in the reactor, heat is involved in all cases; therefore, the heat is a by-product, and I am saying that if we utilize this heat as a by-product which is now being wasted, then it is economical to generate power from this heat.

MR. KLOPSTEG: Why isn't the heat that is being developed in the piles that are operating at the present time being turned to practical use?

MR. BROWN: Well, the only real reason is that the heat is absorbed at substantially room temperature, and in order for heat to be useful for generating power, it must be available at some elevated temperature—let's say 900 or 800 degrees Fahrenheit. Therefore, it is going to require engineering development to operate these piles at a higher temperature, and once that is done, then the heat can be put to some really useful purpose.

## 'Waste of Heat'

MR. DANIELS: It really constitutes an economic crime at the present time to be producing all this heat at a temperature so low that it can't do any useful work.

MR. KLOPSTEG: All it does, as I understand it, is to warm the salmon of the Columbia River.

MR. DANIELS: Very slightly.

MR. MCBURNEY: Tell us a bit more about the use of heat. Am I to look forward to an atomic furnace in my home in my lifetime?

MR. DANIELS: No. Small installations of atomic power will always be impractical. It calls for a large investment, a large unit. Central heating stations would be quite possible, but private furnaces and private automobiles would be out of the question.

MR. MCBURNEY: How does this atomic heat compare with gas, coal, fuel oil and electricity?

MR. DANIELS: Well, in quantity, one pound of these fissionable materials—plutonium or uranium 235—is theoretically equivalent to a whole trainload of coal. This might be worth $10,000, I suppose, but the chance of getting this into any useful form requires a very large capital investment, so these figures are misleading.

MR. MCBURNEY: Well, now, let's get down to brass tacks on this, if we may. You talk about the possibility of a central heating plant, for a city like

Chicago, I take it; this is to be a by-product of war production. Are we to look forward to that? Is that in the cards, Brown—something of that sort?

MR. BROWN: Well, something of that kind I think is very definitely in the cards. I don't know whether the plant would originally be located in Chicago, but at least it can be located so that the power generated would tie in with the high tension distribution systems of the various states, so that the power could be made available to various industries and cities throughout the country. It seems to me that we can look forward to that happening in a relatively short time.

MR. MCBURNEY: Do you think that's the case, Klopsteg?

## Position of Industry

MR. KLOPSTEG: Well, it could be. I can't see industry putting any money into it, though, so long as there hasn't been a better defined statement of policy on the part of government as to where industry fits in the picture.

MR. MCBURNEY: Before we come to that problem—and I think it is a problem—let's talk a little more about the power uses.

I asked about my furnace a while ago. Am I to look forward to a car that is driven by atomic energy, or to an airplane that is driven by atomic energy?

MR. DANIELS: Small units would be absolutely out of the picture. Large units seem possible; theoretically are possible.

A great deal of effort of the atomic energy program is now going into atomic energy for ship propulsion and for airplane propulsion. These are taken seriously. They will come.

MR. MCBURNEY: You mean to say that you could make an atomic engine and put it in an airplane or in a ship?

MR. DANIELS: That's right.

MR. MCBURNEY: Why not in an automobile, then?

MR. DANIELS: Well, you'd have to have a large capital investment, and then you'd have to have six feet of concrete all around your automobile for a shield.

MR. MCBURNEY: Well, I can see that might be a little inconvenient.

MR. KLOPSTEG: It would be a little difficult to design modern streamlined cars around ten tons of concrete.

MR. MCBURNEY: How about these power developments? Do you go along with Daniels on that, Brown?

## Problem of Small Units

MR. BROWN: Yes, in general. It seems to me that due to the limitations of our present knowledge, at least, it does not seem that we can have a small unit such as you would put in an automobile or bus. However, when we come to vessels—either airships or ocean ships—

MR. MCBURNEY: Of course, it would be a little difficult to have a ton of concrete around an airplane, I was about to observe a minute ago.

MR. BROWN: Well, I think I can say our knowledge of shielding is improving very rapidly. We are taking great strides, and we can perhaps get away from this limitation of five feet of concrete and use some other means of shielding these reactors. When that is done, then, of course, the dead weight that must be carried by the vessel is greatly reduced. It looks as though we can expect, within a reasonably short time, practical power units for special uses such as submarines or airships. When that is done, that means we have solved the technological problems of giving off the heat at high temperatures, and if we can combine that knowledge with the knowledge we have of these large piles that are on land, for the production of military purposes, we then can get the heat from these large piles that are producing plutonium and utilize that heat for the generation of power.

It seems to me that these two developments ought to go forward hand in hand, because each one will assist the other in solving the key technological problems.

MR. MCBURNEY: We haven't said anything about these isotopes and their possible use. You mentioned that as a second peacetime use, I believe, in opening the discussion. What are they, and how would they be used?

### Isotopes

MR. BROWN: Well, they are used in many ways. I think one of the other gentlemen here mentioned the use of isotopes as tracers, for following chemical reactions, and for following many scientific developments. Also, these products are useful as a substitute for X-rays in industry. You can take some of these isotopes around in little boxes and hold them up against a steel tank and take an X-ray photograph of the structure of the steel tank while it is right in position. Developments of that kind are extremely promising for scientific and industrial uses.

I think there have been very important developments in the field of medicine. Perhaps others are more capable of speaking on that than I am.

MR. KLOPSTEG: Do you think that if the reactor had not been developed as a wartime emergency, we would still have had isotopes, since we already knew before the war that some isotopes could be produced by accelerators such as cyclotrons?

MR. BROWN: Certainly. We can produce isotopes.

MR. KLOPSTEG: So these are also a by-product of wartime development.

MR. BROWN: That's right.

MR. MCBURNEY: Now, Klopsteg, a minute or two ago, introduced what he thought was a practical problem involved in these developments: Who is going to finance all this? Is it essentially a government project? Is it something that private enterprise ought to get into? How about that, Klopsteg?

MR. KLOPSTEG: Well, it's a little difficult to see clearly just what the economic situation is going to be.

If we are discussing this question on the basis of the government's getting plutonium at as low a price—or at a lower price than it is getting now—by drawing industry into the picture, then we have a situation that might justify considerable development of power for peacetime purposes, distinctly as a by-product of plutonium production. If, on the other hand, the government suddenly lost interest in plutonium, it seems to me that the whole thing would either have to be dropped or else there would have to be government subsidy, purely for the one purpose, namely, of finding out how to produce power from uranium economically.

MR. MCBURNEY: Do you accept that analysis, Kirkpatrick?

### Power from Uranium

MR. KIRKPATRICK: I do. I think we should emphasize the fact that Brown brought out a moment ago, that plutonium need not be bomb raw material, a hundred per cent. It could also be a source of power generated from natural uranium, and on that basis, industry, I think, could afford to put money into a project.

I think right now we might mention the proposal made by Charles Allen Thomas, the Executive Vice President of Monsanto, who, last June, I think, in a commencement address, suggested that a plant of some 75,000 kilowatts might be built out in Idaho, an atomic furnace, if you will, and that this furnace be supplied by the government with uranium raw material from which power would be generated, and that power would be used to produce fertilizers from the abundant supplies of phosphate there in that territory. A peacetime application, certainly. Then, after the uranium had passed through the furnace, it would be taken back to the government for processing. In that way Thomas thought he saw a way for industry, for private enterprise, to participate in this program, and to offset the high capital costs by a reduction in cost of plutonium to the government.

MR. KLOPSTEG: Actually, industry would be playing only a minor role in that whole picture, it seems to me.

MR. KIRKPATRICK: Isn't there a parallel, Klopsteg, in what is happening down in the Tennessee Valley? Dr. Thomas' own company is making elemental phosphorus there with power generated at Muscle Shoals. That power is a by-product, so we are told.

## Government Subsidies?

MR. KLOPSTEG: Of course, the users of the power would be private industries, but I'm thinking of the private industry that has to get into the picture and put up the capital to develop a plant for producing and distributing the power, with huge government subsidies. I think there must be government subsidies, because unless the government were in the picture, I don't think industry would be at all interested in getting into it.

MR. BROWN: I think perhaps that is true, but the same statement goes for the railroads. When the railroads were built across the continental United States, the government gave extensive grants of land to the railroads to give them additional incentive to put their tracks over the Rocky Mountains.

The same thing has been true of the airlines. They have a subsidy—that's what it is—for carrying air mail.

The same thing is true here. It would be a subsidy to the company for the production of plutonium.

And, in fact, our steel industry, you might say, grew up under a subsidy of a high protective tariff. It is common policy of this country to grant subsidies of either direct or indirect nature to the various industries that are developing new uses for our raw materials.

MR. KLOPSTEG: Would you say that industry has manifested a great interest in getting into this field of nuclear power development?

MR. BROWN: I would say "yes," if you use as an indication of that interest the amount of energy that industry is putting forth to have their story heard, and coming forward with proposals for getting into the picture.

MR. MCBURNEY: How much information, Kirkpatrick, does industry have about atomic developments?

MR. KIRKPATRICK: I think I would take a little exception to what Brown said there.

Two years ago the Commission appointed—as you recall—an industrial advisory group, headed by Mr. James Parker of Detroit, at that time President of the American Society of Mechanical Engineers; Dr. Robert Wilson of Standard Oil and Dr. Gustav Egloff of Universal Oil Products and a number of Chicago citizens were on that very important committee.

## Available Information

At that time they reported that they had the feeling that there was a vast fund of information that would be helpful to industry in participating in the program if that were made available.

Subsequently the Commission appointed a group—an *ad hoc* committee or technological committee—which has been studying the patent files, and, more recently, one of the complete projects at Oak Ridge.

We find, in the main, that the Commission is releasing and declassifying this information and that there is not this vast fund of information that the Parker committee referred to.

On the other hand, I feel very strongly that until industry gets a better look into the problems of the Commission and the problems of the atomic energy program, we can't have this full participation. I think it is desirable that we do have it.

MR. KLOPSTEG: Isn't it true, Kirkpatrick, that even those industries that have had large contracts with the Atomic Energy Commission for operating Commission properties haven't shown too much eagerness to invest private capital in atomic energy development?

MR. KIRKPATRICK: Well, I think that is perhaps true—a relatively small group.

MR. KLOPSTEG: And they have had an intimate look at it.

MR. MCBURNEY: Brown?

MR. BROWN: Well, all those contracts have been what we call cost-plus contracts, and in many ways, if you give a company a cost-plus contract, it makes a sort of parasite industry; it's not a free industry in the sense of free enterprise.

On the other hand, if we can get the private enterprise to come forward with a proposal to build a reactor for the purpose of producing plutonium and power — build that reactor on a lump sum basis, and then process the material to produce plutonium on a unit price basis, and allow that company to retain any profits that accrue due to their efficient operation of the plant, then we have free enterprise in the picture. I think that is what Dr. Thomas had in mind, and that is substantially what he proposed.

## Misuse

MR. KLOPSTEG: In the Thomas proposal, wasn't there one other point, namely, that if government found that any of these—shall we say—restricted things, such as fissionable materials, are being misused, then government could come in and shut down the plant?

MR. BROWN: Government can do that in any industry of any kind. They always have the power in wartime to come in and shut down.

MR. KLOPSTEG: Even in peacetime, though, I think that should probably be invoked, and under those conditions I doubt whether industry would be too keen to get into it.

MR. BROWN: I think we can offer all kinds of reasons why industry might not wish to get into it, but the only way to prove the thing is to give them a chance to come in by asking for proposals, and if they come forward with proposals, I think that is the proof of the pudding.

MR. DANIELS: I think you'll be surprised to see how many of them will come in.

MR. MCBURNEY: How has industry received this Thomas plan we have been talking about, or has that had much currency outside your circles, scientific circles?

MR. BROWN: I doubt very much if industry has really had an opportunity to study it. Personally, I would like to encourage industry to study those proposals and see what they can come up with. I have hopes that they will be given that opportunity.

## Location of Plants

MR. MCBURNEY: We have been talking about the government role in this business, and the role of private enterprise. I think the general public would be interested in the location of these power plants that you gentlemen are talking about. What if one blows up? Is there any danger that they will contaminate the atmosphere, contaminate nearby waters?

How about that, Daniels?

MR. DANIELS: The Atomic Energy Commission has adopted a very conservative policy on this matter, and rightly so—no large reactor can be operating near to cities.

There is a proving ground established out in Idaho. I think that after a little practice in Idaho, it will turn out that it will be quite safe to put these plants nearer the cities. Obviously, we shouldn't do it until we try these pilot plants.

MR. MCBURNEY: You don't think that practice in Idaho will be hard on our listeners in Idaho?

MR. DANIELS: No, I don't. I think there is very little danger. You certainly wouldn't get an atomic explosion under any conditions. The worst that could happen would be something equivalent to a boiler explosion, with serious addition of radioactive materials, but I think this can be kept under control.

I think it was true, was it not, that when automobiles came in, many conservatives were afraid of sitting on top of ten gallons of gasoline?

MR. MCBURNEY: Yes, I guess that was the case.

Are you as optimistic about these dangers as Daniels?

MR. KLOPSTEG: Oh, yes. I think development has already proceeded pretty far, so that we can say that there is relatively little danger, even now, if a reactor is properly built and under good automatic control.

MR. DANIELS: I'd like to make one more point before we close.

We think in terms of plutonium only for atomic bombs. We must realize that when the world really gets into a proper state of peace, we can use this stockpile of atomic bombs for peacetime power—one pound equivalent to a trainload of coal, theoretically.

## Uranium Supply

MR. MCBURNEY: How about the supply of uranium, Daniels? I take it that all of these developments we are talking about stem from that—shall I call it a chemical?—from uranium, an element. How about the supply of uranium?

MR. DANIELS: I'm not prepared to say. According to prewar estimates, there wasn't enough uranium to be very significant for power purposes, but uranium wasn't very much sought after. Intensive prospecting is going on now. I would be surprised if we don't find new deposits and ways of using more low-grade ore.

MR. BROWN: I'm not sure how accurate estimates might be, but estimates have been made that indicate the heat that can be obtained from nuclear reactors operating on plutonium—based on the estimates as to the availability of uranium—would indicate that the heat that can be obtained would be approximately equal or would exceed the heat that has been obtained and is to be obtained from our petroleum reserves throughout the world. That gives us a sort of order of magnitude by which we can gauge things.

## Availability

MR. MCBURNEY: Is the uranium you are discussing available to us? Where is it, anyway, or are you prepared to say?

MR. BROWN: Uranium is found in various places all over the earth, in small areas where it can be recovered according to present methods, and just as we have to drill deeper and deeper for oil as the years go by, we may have to use leaner and leaner ores of uranium as the years pass.

MR. MCBURNEY: Gentlemen, this has been an exceedingly interesting discussion.

I take it that if we are to look forward practically to these peacetime developments of heat and power, there is going to be—as I see it— a partnership between government and private enterprise. Is that putting it correctly, Brown?

MR. BROWN: I think that is necessary, at least for some time.

MR. MCBURNEY: And that the government will be in the business to produce atomic bombs, and as a by-product of those bombs we might reasonably look forward to the use of atomic energy for heat and power.

# Suggested Readings

Compiled by M. Helen Perkins, Assistant, Reference Department, Deering Library, Northwestern University

ROTHMAN, S. C., ed. *Constructive Uses of Atomic Energy.* New York, Harpers, 1949.

Fourteen essays on the use of atomic energy in industry, medicine, and other non-military fields.

*Atlantic Monthly* 177: 68-73, Ja., '46. "The Medical Uses of Atomic Energy."

A discussion of radio isotopes and their potential use in medicine.

*Collier's* 125: 14-15, Jly. 15, '50. "Toward the Industrial Atomic Future." D. E. LILIENTHAL.

Points to the advisability of allowing free enterprise a larger role in industrial atomic development.

*Collier's* 124:36, O. 29, '49. "Strangest Garden in the World." J. W. WHITE.

Isotope gardening produces radioactive drugs to be used in medical research.

*Collier's* 123:18-19, Je. 11, '49. D. E. LILIENTHAL. "What Good Is the Atom?"

A discussion of the potential peacetime uses of atomic energy.

*Commercial and Financial Chronicle.* 170:2636, D. 29, '49. "Prospects of Industrial Use of Atomic Energy." L. R. GROVES.

Cost is a major consideration in private industry's use of atomic energy.

*Commercial and Financial Chronicle.* 169:2821, Je. 30, '49. "Potential Uses of Nuclear Energy." G. T. SEABORG.

In addition to serving large industries, nuclear energy can be used in propulsion; it will also enable the establishment of industries in remote areas.

*Discovery* 11:186-89, Je., '50. "Radio Active Sewage."

Fully illustrated description of radio active sewage disposal.

*Discovery* 9:78-82, Mr., '48. "Atomic Power: What Are the Prospects?" M. H. L. PRYCE.

Discusses methods of producing electric power from atomic energy and the problem of fuel supplies, breeding piles and time factor.

*Discovery* 9:58-61, F., '48. "Labelled Atoms." R. G. GLASCOCK.

Discusses the use of isotopes in biology and medicine.

*Electrical Engineering* 66:631-8, Jly., '47. "Atomic Energy in Industry." H. A. WINNE.

A discussion of the possibilities and problems of applying atomic energy in the production of power.

*Fortune* 39:53-60, Ja., '49. "Atom and the Business Man."

Discussion of problems faced by private industry in entering atomic energy program.

*General Electric Review* 51:11-15, Ag., '48. "Some Problems in the Industrial Applications of Atomic Energy." K. H. KINGDOM.

The problems and requirements in constructing reactors for development of industrial power are described.

*Harper's* 200:50-56, Je., '50. "Atomic Engines—When and How." L. CASSELS.

Long-run uses of atomic power depend upon reduction of costs and the increase of fuel supplies.

*Harvard Business Review* 28:45-54, Mr., '50. "Atomic Power and the Location of Industry." W. ISARD and V. WHITNEY.

Discusses the possible effects of atomic energy on industry and its location.

*Harvard Business Review* 27:459-79, Jly., '49. "Atomic Power in Selected Industries." S. H. SCHURR.

An approach toward understanding the industrial implications of atomic energy and the problems that will be encountered by industry in the change over process.

*Nation* 170:495-96, My. 20, '50. "The Potential of Atomic Energy for Peace Time Use." E. U. CONDON.

Potential uses of atomic energy in chemical and biological research are indicated.

*Scholastic* 56:16, Mr., '50. "Atomic Energy." S. T. PIKE.

A summary of the use of radio isotope and radio phosphorous in medical and agricultural research.

*Science Digest* 28:59-62, Se., '50. "Now! Speedy Test for Brain Tumors." H. BAILEY.

High degree of accuracy reported in detecting and locating brain tumors through the use of radio active dye.

## *Have You Read These Issues*

of the

# Northwestern Reviewing Stand?

*List of all available issues on request*

VOLUME XIII

21. What Should the Government Do for the Aged?
22. That Man John L. Lewis.
23. Christianity and Communism.
24. Is Aviation Fulfilling Its Peacetime Role?
25. We Forsee in 1950.
26. Selling Your Ideas on the Job.

VOLUME XIV

1. Is Mercy Killing Justifiable?
2. Can We Stop the Common Cold?
3. What Is America Reading?
4. Should America Develop the World's Resources?
5. The Responsibilities of Business to Society.
6. Should We Educate the Spirit in Our Public Schools?
7. The Problem of Allergy.
8. Is Deficit Spending Sound?
9. The Saar—European Trouble Spot.
10. Should Children Be Spanked?
11. Are We Neglecting the Exceptional Child?
12. Should Gambling Be Legalized?
13. Is A United Church Possible Now?
14. The Fact-Finding Board in Labor Disputes.
15. Do Our Democratic Liberties Depend on Mental Health?
16. Are We Drifting Toward Socialism?
17. How Can We Combat Musical Illiteracy?
18. Do We Want the Welfare State?
19. Natural Versus Synthetic Rubber.
20. Can We Maintain a Bipartisan Foreign Policy?
21. Divorce: An American Tragedy.
22. Can We Control Divorce?
23. What Is Happening to Our War Babies?
24. What Does the Extension of Rent Control Mean?
25. Do We Need a Government Housing Program?
26. Is World Trade the Pathway to World Peace?

VOLUME XV

1. What Do Our Teen-Agers Think of America's Future?
2. What Are Your Real Interests?
3. What Does Korea Mean to America?
4. The Korean Crisis and the Home Front.
5. Is Germany Turning East or West?
6. Can We Stop Polio?
7. Who Should Go to College?
8. What Should I Do in an A-Bomb Attack?

THE REVIEWING STAND
Northwestern University
Evanston, Illinois

☐ I enclose $1 for a 16-week subscription
☐ I enclose $2 for a 32-week subscription
☐ I enclose $2.50 for a 52-week subscription
(Single copies are available at 10 cents each.)

Name .....

Address .....

City ..... State .....